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maps serve to set forth in sequence the many stages in this history, including that of the newly discovered Lake Arkona.

The book by Professor Ruska of Heidelberg is an initial attempt to meet a like demand at the German university. Dr. Ruska has the gift of literary style and the ability to present his subject in attractive form without loss of scientific accuracy. Different geological formations and significant surface features come each in turn under discussion in connection with well-planned excursions from Heidelberg. No less than 138 illustrations, many of them original and all well chosen, make the eye the pathway to the mind. Professor Ruska not only knows his field, but he has shown excellent judgment in selecting and arranging his material. W. H. H.

Rocks and Rock Minerals. By LOUIS V. PIRSSON, Professor of Physical Geology, Yale University. 12mo, pp. 414. New York: John Wiley & Sons, 1908.

The new petrology by Professor Pirsson is a volume whose merits are more fully appreciated when one considers the difficulties inherent in the subject, not the least of which is that of classification. If it be remembered that the early and simple classifications based on megascopic characters have gradually become more and more complicated as microscopical investigations progressed until at present they cannot be satisfactorily used without the microscope, it may be admitted that a simplified classification for field work and similar uses has become extremely desirable. The classification adopted in the new work is essentially the same as the "field classification" first proposed in connection with the Quantitative Classification of Igneous Rocks, of Cross, Iddings, Pirsson, and Washington in 1903. On this basis Pirsson has succeeded in presenting in attractive style not merely the major facts of petrology, but also an excellent description of those things which give the science life and human interest. Thus, he not only defines a given rock from every point of view, but he describes its mode of occurrence, its alteration products, its various uses, and, frequently, its relation to ore deposits.

The book is, of course, not adapted to the needs of the geologist and petrographer, but to those of engineering and general students whose knowledge of the subject need not be profound. It is arranged in three parts: an introductory part of twenty pages dealing with the scope, history, and methods of petrology, and the chemical character of the earth's crust: a second part of 112 pages describing briefly the rock-forming minerals and giving short tables for their determination; and the main part dealing with igneous, sedimentary, and metamorphic rocks successively, and closing

with a short table for determining rocks. The illustrations are numerous and remarkably well chosen.

In discussing the origin of the porphyritic texture in igneous rocks Pirsson expresses the current view among petrographers in declaring that the idea of a change in the rate of solidification (for example, intratelluric and extratelluric crystallization) is not an adequate explanation of all occurrences. But it seems to the writer that the labile and metastable states proposed by Miers and indorsed by Pirsson as an explanation of the porphyritic texture are equally unsatisfactory. It seems to merely give names to certain conditions or states in magmas which may produce the texture, without explaining anything. Why such conditions should exist in some cases and not in others—in fact, why they should exist at all—is not clear. The writer would suggest that if we admit the existence of eutectics in igneous rocks (and Pirsson appeals to them to explain salic border zones) we have in their laws a reasonable explanation of the porphyritic texture. Thus, it is well known that any constituent present in a solution in greater amount than the eutectic proportion will begin to crystallize at a temperature above that required for the solidification of the eutectic itself, and will continue to crystallize until the cooling reaches that temperature; then the eutectic will crystallize at that temperature. It is clear then that with a uniform rate of cooling this process will give a much longer period of crystallization to the minerals in excess of the eutectic proportion than to the eutectic itself. This longer period of crystallization would naturally result commonly in larger crystals, that is, the porphyritic texture. In this connection it might be mentioned that Pirsson's statement on p. 171 that "the substance in greatest excess, the solvent, will solidify first" is quite misleading, since the substance in greatest excess is not necessarily the solvent nor the first thing to solidify.

Other minor errors include the crediting of tests of Wisconsin granites (p. 209) to Bain instead of to Buckley, and the omission of silica in the paragraph on the elements of geological importance (p. 19). On p. 135 Pirsson defines as "hade" and "trend" what are ordinarily called dip and strike. It is not clear that anything is gained by the change, and it must result in some confusion. On the other hand he draws the distinction (p. 158) sharply and well between textures and structures in rocks, and describes numerous examples of each. His discussions of the difficult subjects of metamorphism, differentiation, etc., are remarkably well adapted in their simplicity and clearness to the place they occupy. As is to be expected, they reflect chiefly the views of the German school of petrographers.

A. N. W.